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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SECTION 06182

GLUE-LAMINATED STRUCTURAL UNITS

06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers the fabrication and erection of laminated wood arches, beams, purlins, columns, and all metal shapes and hardware required for installation. The term "laminated wood" comprises suitably selected and prepared wood laminates bonded together with adhesives, the grain of which is approximately parallel longitudinally.

Drawings must include:

Details of all laminated wood members, showing cross sections and dimensions

Assumed loads, including floor live load, roof live load, wind load, and concentrated loads (partitions, equipment to be mounted on or suspended therefrom)

Layout, showing location of laminated members and floor elevations

Details of hangers for suspended ceilings, pipes, light fixtures, or other construction, as required

Details of metal shapes and hardware required for connections.

Associated work found in other sections includes:

Pressure preservative treatment for protection against decay and insects: See Section 06100 ROUGH CARPENTRY. It should be incorporated into specification when wet conditions of use prevail.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be

manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

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The publications listed below form a part of this section to the extent referenced:

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC 117	(1993) Structural Glue Laminated Timber of Softwood Species
AITC 200	(1992) Inspection Manual

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.22.1	(1975; R 1998) Plain Washers
ANSI B18.22M	(1981; R 2000) Metric Plain Washers

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C1	(2003) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C28	(1990) Structural Glued Laminated Members and Laminations Before Gluing, Pressure Treatment

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2004) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283/A 283M	(2003) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A 307	(2003) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM E 84	(2003) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F 568M	(2002) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 56	(1973) Structural Glued Laminated Timber

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003	(2002) Grading Rules

U.S. DEPARTMENT OF DEFENSE (DOD)

MS MIL-L-19140	(1997e) Lumber and Plywood, Fire-Retardant Treated

UNDERWRITERS LABORATORIES (UL)

UL 723	(2003) UL Standard for Safety Test for Surface Burning Characteristics of Building Materials

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17	(1993) Standard Grading Rules for West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA-01	(1993) Western Lumber Grading Rules 91

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

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The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-02 Shop Drawings

Fabrication Drawings and Installation Drawings shall be submitted in accordance with paragraph entitled, "Drawings," of this section.

SD-03 Product Data

Manufacturer's Catalog Data shall be provided in accordance with paragraph entitled, "Manufacturer's Information," of this section.

SD-04 Samples

Three samples of Exposed-to-View Surfaces shall be submitted in accordance with paragraph entitled, "Surfaces," of this section.

SD-07 Certificates

Certificates for Glue-Laminated Structural Units shall be

submitted in accordance with paragraph entitled, "Quality Control."

SD-08 Manufacturer's Instructions

Manufacturer's Instructions shall be submitted for the following items in accordance with paragraph entitled, "Quality Control," of this section.

Laminated Wood Materials
Adhesive

1.3 FIELD MEASUREMENTS

Field measurements shall be taken prior to preparation of shop drawings and fabrication to ensure proper fitting of the work.

1.4 QUALIFICATIONS FOR LAMINATING WOOD MANUFACTURER

Laminated wood members shall be manufactured by an approved firm licensed by the American Institute of Timber Construction to use the AITC quality inspected mark and to issue the AITC certificate of conformance. Manufacture of the laminated timber shall meet the requirements of AITC 117.

1.5 DELIVERY, HANDLING, AND STORAGE

Laminated wood structural members shall be delivered in such quantities and at such times as to ensure the continuity of the installation of structural members and maintenance of progress schedules.

Packaged or wrapped materials shall be delivered in their original, undamaged wrapping, bearing label clearly identifying manufacturer's name, grade and species of lumber, type of glue, and other pertinent data. Nonmarring slings shall be used for loading, unloading, and handling members to prevent damage to surfaces or wrapping.

Wrapped materials shall be stored in their original wrapping until ready for installation.

Members shall be placed on level supports off ground, spaced and braced to allow through ventilation. Wood shall be covered and kept free of dirt, grease, moisture, or foreign matter that could cause staining.

1.6 DRAWINGS

Fabrication Drawings shall be submitted for glue-laminated structural units consisting of fabrication and assembly details to be performed in the factory.

Installation Drawings for glue-laminated structural units shall include dimensions of laminated wood members, location, size, and type of reinforcement, including any reinforcement necessary for safe handling and erection of structural members. Drawings shall show layout identifying each structural member and the corresponding sequence and procedure to be followed in installation, and location and details of anchorage devices that are to be embedded in other construction.

1.7 MANUFACTURER'S INFORMATION

Manufacturer's Catalog Data shall include erection procedure for laminated

structural members, including the sequence of erection, temporary supports and bracing, and lifting and handling equipment.

Manufacturer's Instructions shall be submitted for Laminated Wood Materials and Adhesive including special provisions required to install equipment components and system packages. Special notices shall detail impedances, hazards and safety precautions.

PART 2   PRODUCTS

2.1   MATERIALS

2.1.1   Lumber

Wood members shall be coast region Douglas fir or larch, graded in accordance with the grading provisions of WCLIB Std 17 or WWPA-01.

Wood members shall be southern pine, graded by the same basic provisions as used for solid sawn lumber in SPIB 1003.

Wood species shall meet the structural requirements of NIST PS 56 and applicable local codes.

Laminating lumber shall be kiln-dried and stress-graded to meet the requirements of AITC 117.

Lumber combination shall be determined by the design requirements for each component and designated on the shop drawings. AITC lumber combination symbols shall be used for this identification.

Laminated wood members shall have a maximum moisture content of 14-percent throughout the entire piece before surfacing and bonding.

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NOTE: Select one of the following appearance grades:

Premium grade has the finest appearance with a smooth surface free of knot holes and voids.

Architectural grade contains normal growth characteristics such as tight knots and medium seasoning checks.

Industrial grade has a greater number of open defects, including knot holes. Industrial grade is appropriate for industrial installations, floor beams, concealed construction, or other applications where appearance is not an important consideration.

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Laminated wood shall be AITC [Premium] [Architectural] [Industrial] Grade.

2.1.2   Fire-Retardant Treatment

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NOTE: Include heading and following paragraphs when fire-retardant treatment is required to achieve a specified flame spread rating. Fire-retardant treatment is intended and recommended only for

interior use and in locations not subject to alternate wetting or drying action.

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Fire-retardant treated wood shall be pressure impregnated by an approved process in accordance with AWPA C1 and AWPA C28.

After pressure treatment, wood members shall have a UL flame spread rating not greater than 25. Wood shall show no evidence of progressive combustion when tested for 30 minutes in accordance with UL 723 and ASTM E 84.

Penetration of fire-retardant material of treated wood shall be in accordance with MS MIL-L-19140. Depth of penetration shall be determined by borer cores taken from 20 pieces of each charge and tested. If 80 percent of the borings meet the penetration requirements, the charge will be accepted.

Approved fire retardant wood members shall bear identification showing their fire retardant rating, issued by an approved testing agency.

After treatment, wood shall be kiln-dried to remove the moisture injected during treatment to an average moisture content of not more than 19 percent.

2.1.3 Adhesive

Laminated members shall be bonded with a waterproof adhesive conforming to the test requirements of NIST PS 56 for waterproof glue, shear strength and durability.

2.1.4 Finishes

[Laminated wood shall receive one factory-applied coat of sealer to the ends of members immediately after trimming. Other surfaces shall receive one coat of penetrating clear sealer.]

[Laminated wood shall receive one factory-applied coat of sealer to the ends of members immediately after trimming. No other sealer shall be required.]

[Laminated-wood members shall be left unfinished after final surfacing and sanding.]

[Laminated-wood members shall be factory finished with a stain and clear varnish.]

[Laminated-wood members shall receive one coat of factory-applied paint primer and field-applied paint finish.]

2.1.5 Hardware

Contractor shall furnish metal shapes, plates, and bars needed for assembly and connection of members.

Steel plates shall be hot-rolled carbon steel of structural quality, conforming to ASTM A 283/A 283M, Grade C.

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NOTE: Delete the following paragraphs when anchor bolts are not required. Anchor bolts are normally

required for column base connections.
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Steel anchor bolts shall be low-carbon steel with regular hexagon nuts and carbon steel washers. Anchor bolts and nuts shall conform to ASTM A 307 ASTM F 568M.

Washers shall be plain washers conforming to ANSI B18.22.1 ANSI B18.22M.

Metal surfaces shall be cleaned of oil, dirt, rust, and foreign matter. For exterior locations, the hardware shall be hot-dipped galvanized in accordance with ASTM A 153/A 153M, with coating weight as required for Class A, B, C, or D material as described therein. Other metal surfaces shall receive one coat of manufacturer's standard rust-resisting metal primer applied at a minimum dry-film thickness of 1.5 mils 0.038 millimeter.

2.2 QUALITY CONTROL

Certificates for Glue-Laminated Structural Units shall include a laboratory report for the laminated wood and for the laminating adhesives as follows. Report shall include the checking of moisture content, surfacing, temperature of lumber at time of gluing, adhesive mixing and spread, and adhesive pressure and curing conditions during the manufacturing process. Report shall also include the results of tests, shear strength, and durability of the glue line and shall meet the requirements of NIST PS 56. Material tested shall be typical of a production run of the same material to be used in the project. Tests shall be conducted within 6 months prior to delivery of the wood.

Certification that structural members meet the requirements of NIST PS 56 and AITC 200.

2.3 SURFACES

Three samples, 12-inches 300 millimeter long by sufficient width and thickness to illustrate the quality and color of Exposed-to-View Surfaces shall be submitted.

PART 3 EXECUTION

3.1 INSTALLATION

Spacing and placement of members and installation methods shall be as indicated and approved.

3.2 PROTECTION AGAINST MOISTURE LOSS

After installation, each member shall be covered with a temporary waterproof protection to maintain the moisture content of the wood. Protection shall be maintained until members are enclosed within the building and final coats are about to be applied. Initial building heat shall be elevated gradually to the desired level. To minimize checking, the relative humidity of the building shall not be rapidly reduced.

-- End of Section --